Session V

Guarding Against the Perfect Electric Storm

It's all about reliability and whether passage of the proposed federal energy legislation will best serve that critical end. It's also about the role that states have with respect to maintaining and ensuring grid reliability in their respective jurisdictions! Who is to assume the critical role of implementing and enforcing reliability standards?

- **Moderator**:

  Leslie Recht – Partner, Defrees & Fiske LLC

- **Presenters**:

  Gerry Cauley – Director of Standards, North American Electric Reliability Council

  Reem Fahey – Director Market Policy, Edison Mission Energy / Midwest Generation

  Kevin Kelly – Senior Counsel, Division of Policy Analysis & Rulemaking; Office of Markets, Tariffs and Rates, U.S. Federal Energy Regulatory Commission

  Richard L. Mathias – Senior Consultant, PJM Interconnection LLC

  Louise McCarren – Chief Executive Officer, Western Electricity Coordination Council

  The Honorable Kevin Wright – Commissioner, Illinois Commerce Commission

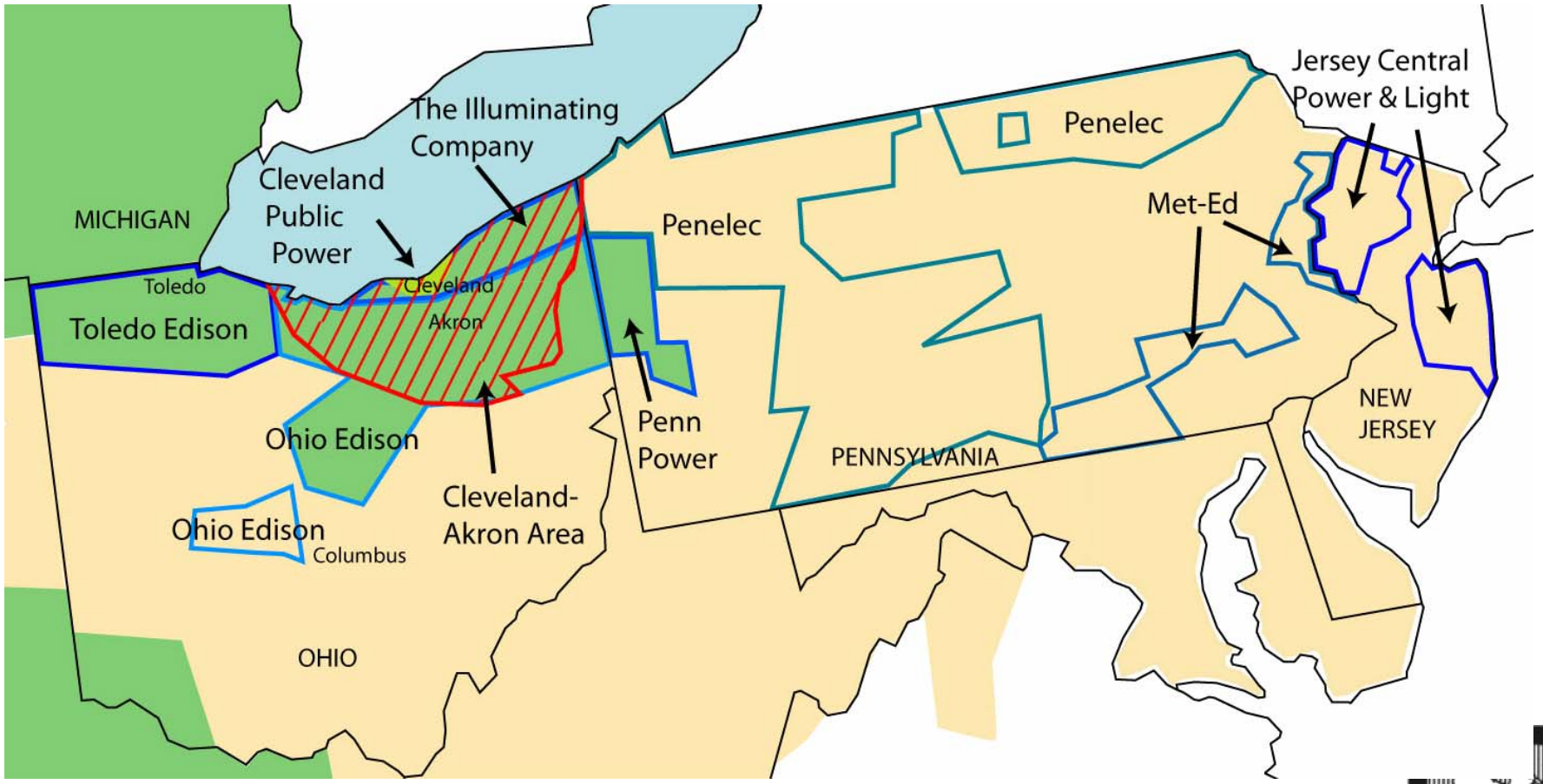
Note:

Additional materials for this session may be provided at the conference.

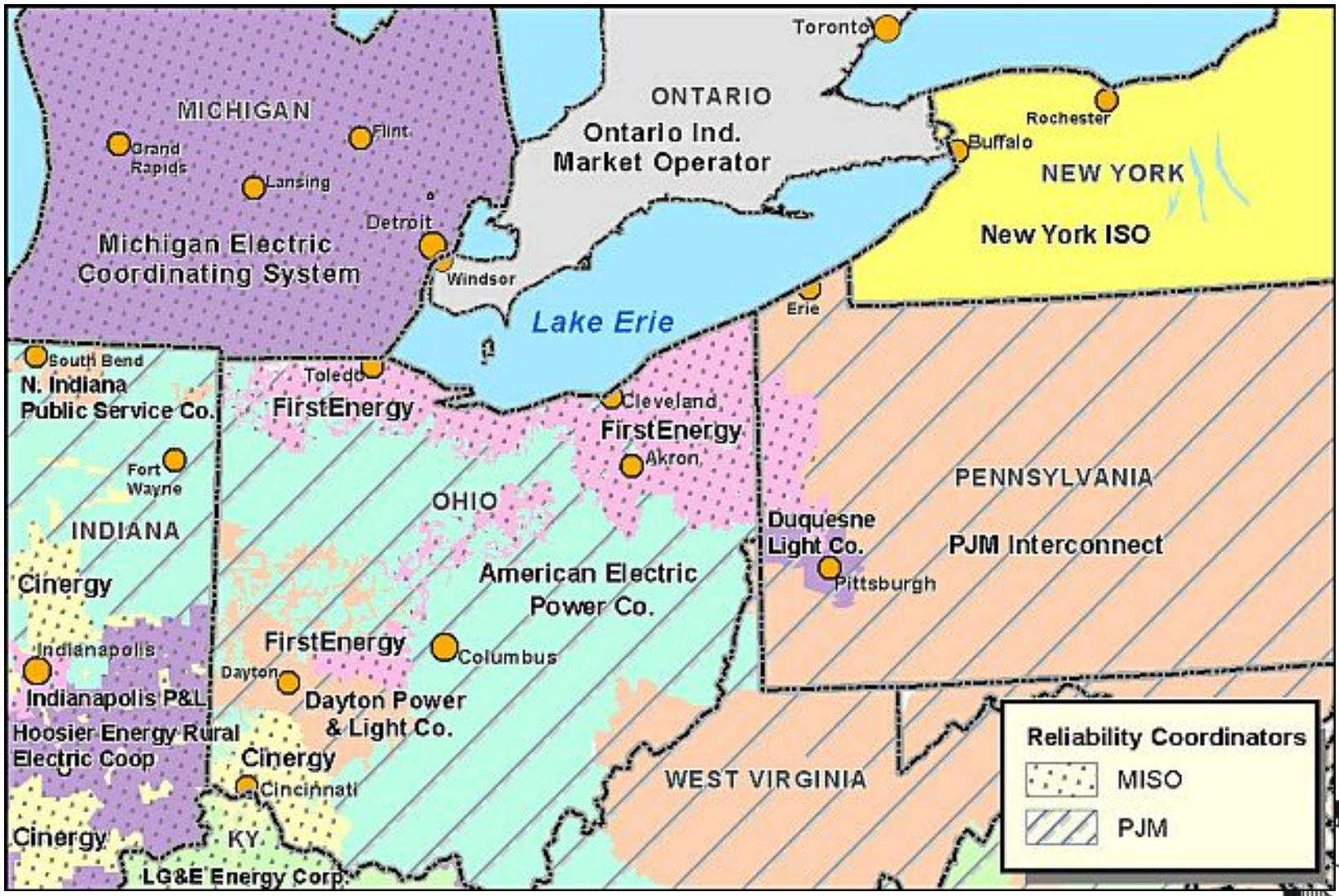
August 14, 2003 Blackout

Gerry Cauley
Director – Standards
North American Electric Reliability Council

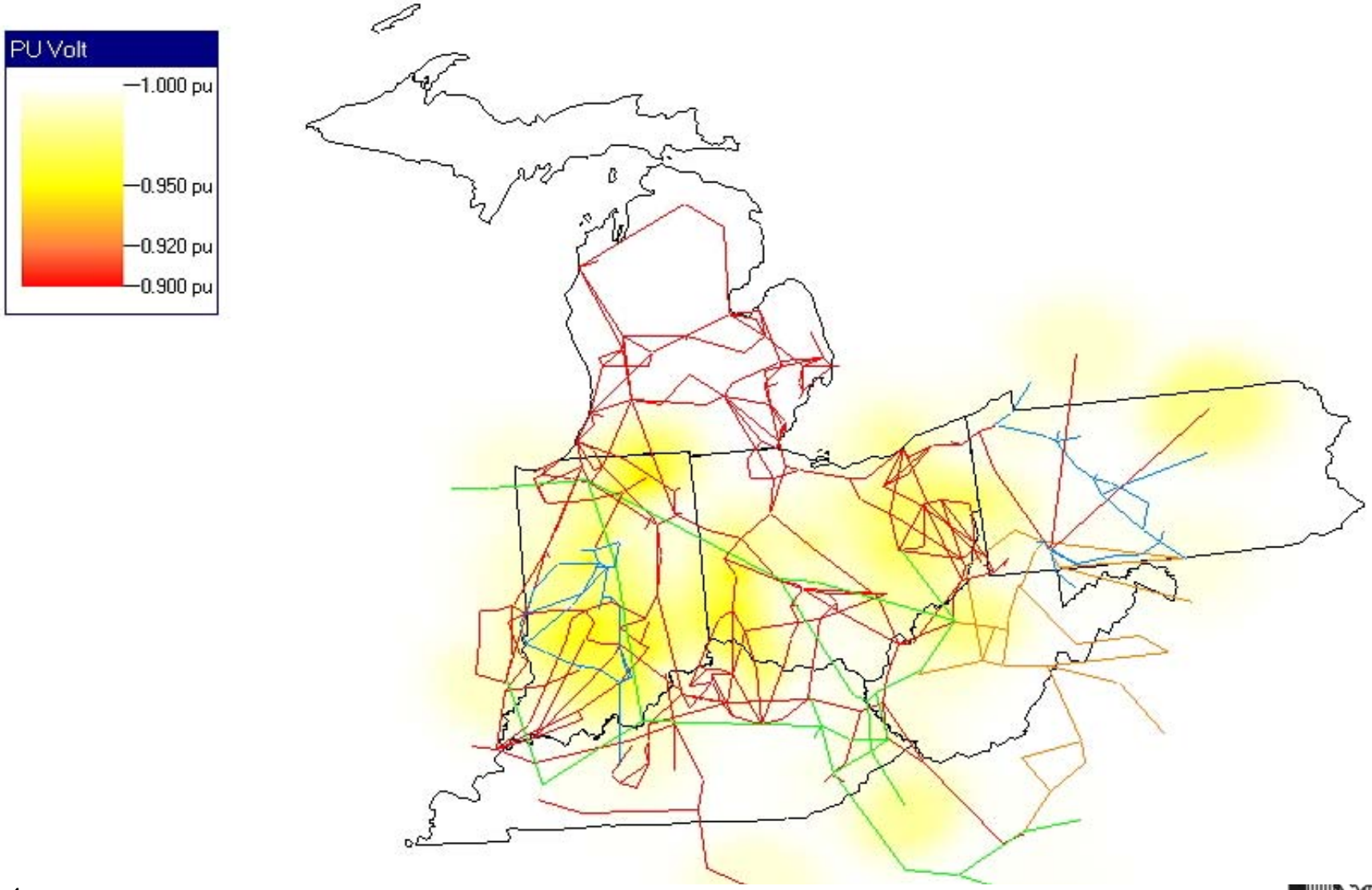
FirstEnergy Operating Areas



Footprints of Reliability Coordinators in Midwest

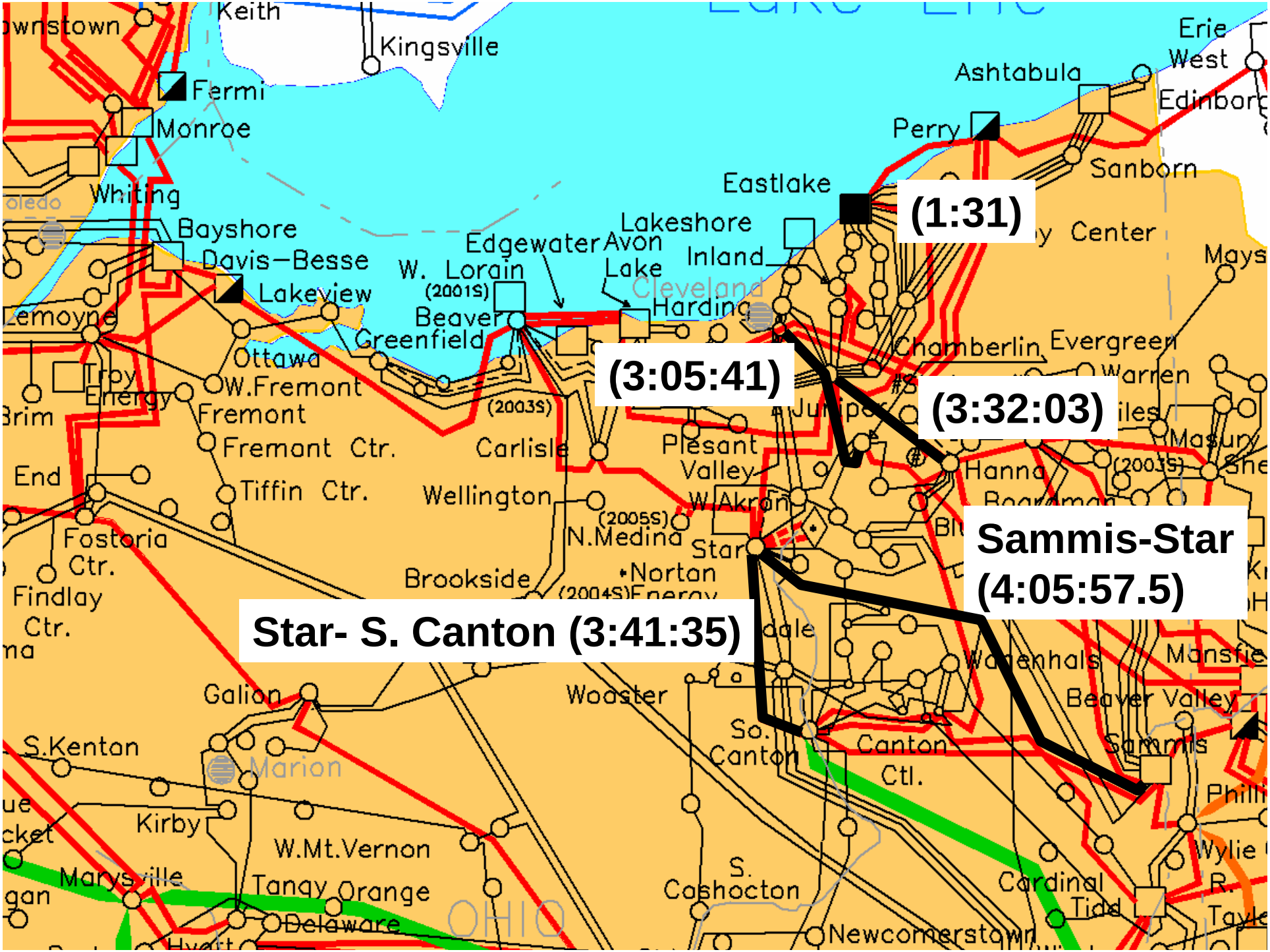


Voltages Prior to 15:05 EDT August 14



FirstEnergy Computer Failures

- 14:14 Alarm logger fails and operators are not aware
- 14:20 Several remote consoles fail
- 14:41 EMS server hosting alarm processor and other functions fails to backup
- 14:54 Backup server fails
- 15:08 IT warm reboot of EMS appears to work but alarm process not tested and still in failed condition
- No contingency analysis of events during the day including loss of East Lake 5 and subsequent line trips


(1:31)
(3:05:41)
(3:32:03)
Sammis-Star
(4:05:57.5)
Star- S. Canton (3:41:35)
Keith
Kingsville
Fermi
Monroe
Whiting
Bayshore
Davis–Besse
Lakeview
Lemoyne
Troy Energy
Ottawa
W.Fremont
Fremont
Fremont Ctr.
Tiffin Ctr.
Fostoria
Findlay Ctr.
Galion
S.Kenton
Marion
Kirby
W.Mt.Vernon
Marysville
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Delaware
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Carlisle
Wellington
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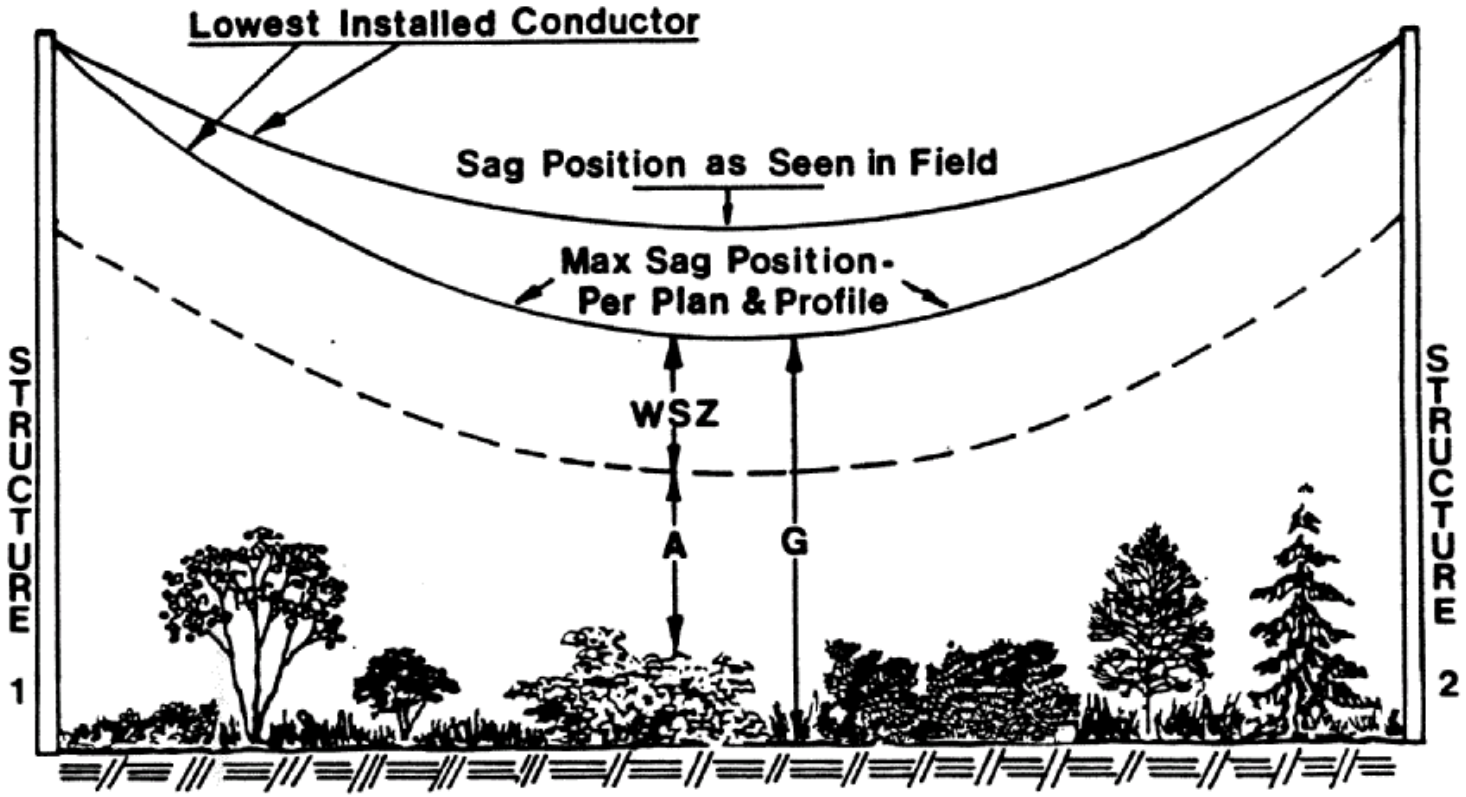
N.Medina
Brookside
Avon Lake
Lakeshore
Inland
Harding
Cleveland
Pleasant Valley
W.Akron
Star
Norton
Wooster
So. Canton
Canton Ctl.
S. Coshocton
Newcomerstown
Eastlake
Perry
Ashtabula
Erie West
Sanborn
Chamberlin
Evergreen
Warren
Hanna
Masury
Warrenhals
Beaver Valley
Sammis
Cardinal
Tidd
OHIO

Hanna - Juniper Tree Contact
Insufficient Clearance with Trees



G = Max Sag Ground Clearance – Determined from Line Plan & Profile

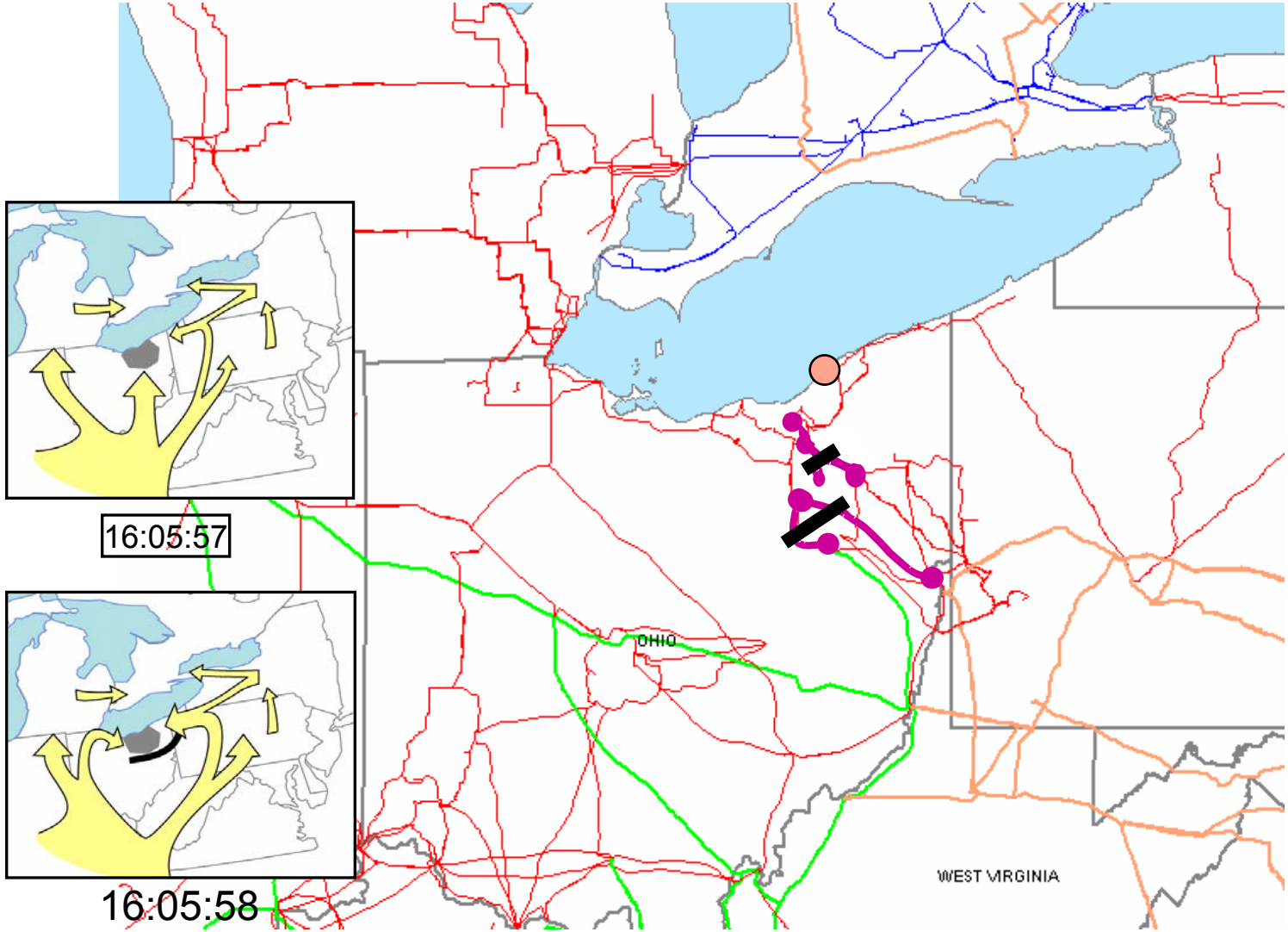
WSZ = Wire Security Zone (Table 1)

A = Additional Clearance to allow for Growth of Vegetation

Phone Calls to FirstEnergy

- FE received calls from MISO, AEP, and PJM indicating problems on the FE system but did not recognize evolving emergency
  - 14:32 AEP calls regarding trip of Star-S. Canton
  - 15:19 AEP calls again confirming Star-S. Canton trip and reclose
  - 15:35 Calls received about “spikes” seen on system
  - 15:36 MISO calls FE regarding contingency overload on Star-Juniper for loss of Hanna-Juniper
  - 15:45 FE tree trimming crew calls in regarding Hanna-Juniper flashover to a tree
  - PJM called MISO at 15:48 and FE at 15:56 regarding overloads on FE system

Last Major Path to Cleveland Blocked after Loss of Sammis-Star 4:05:57.5 PM



Blackout Root Cause Group 1 FirstEnergy Lack of Situational Awareness

- Did not have an effective contingency analysis capability
- Did not have effective procedures to ensure operators were aware of the status of critical monitoring tools
- Did not have effective procedures to test monitoring tools after repairs
- Did not have additional high level monitoring tools after alarm system failed

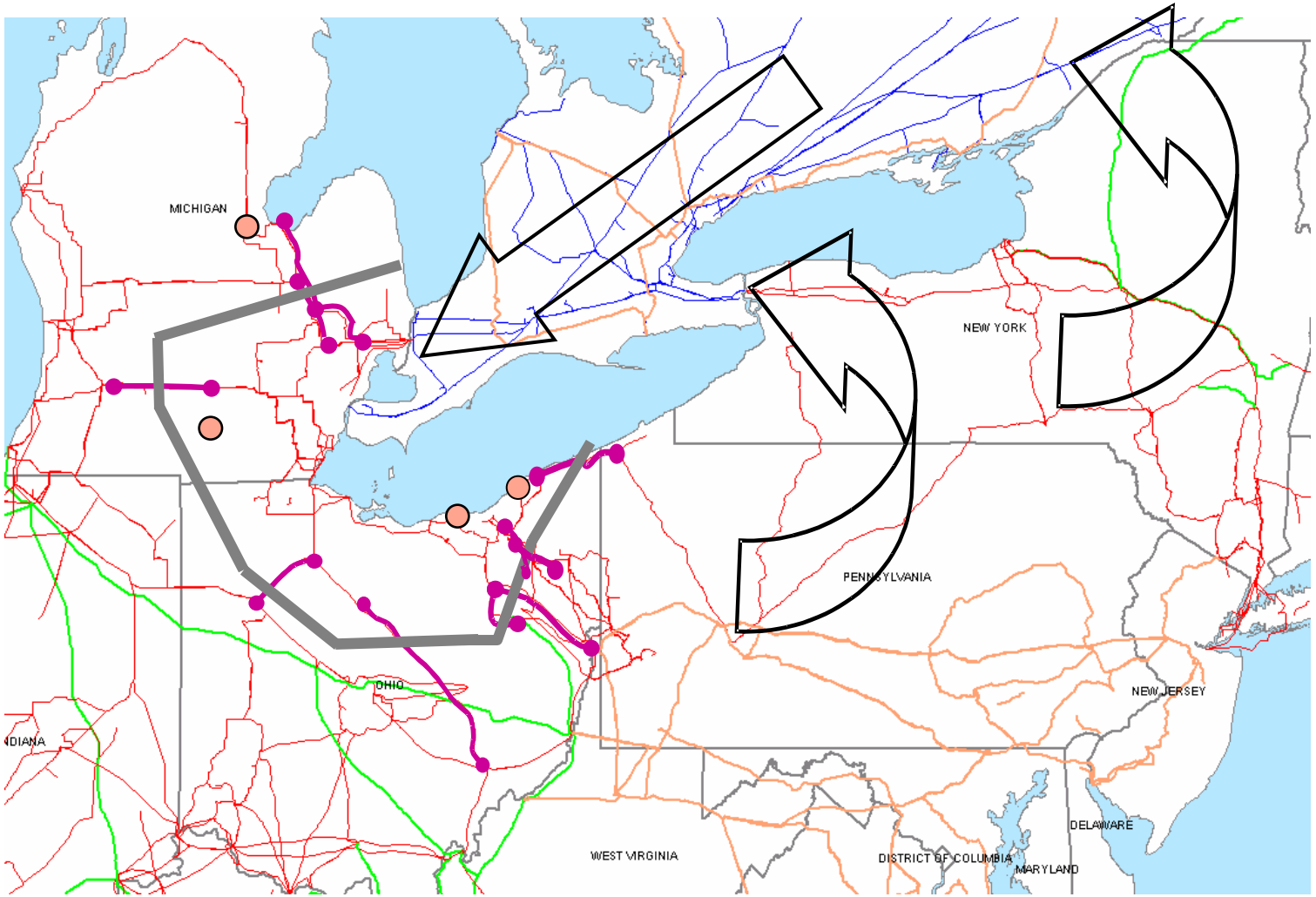
Blackout Out Root Cause Group 2
FirstEnergy Ineffective Vegetation Management

- Did not adequately manage ground clearance (tree trimming) in its transmission rights of way

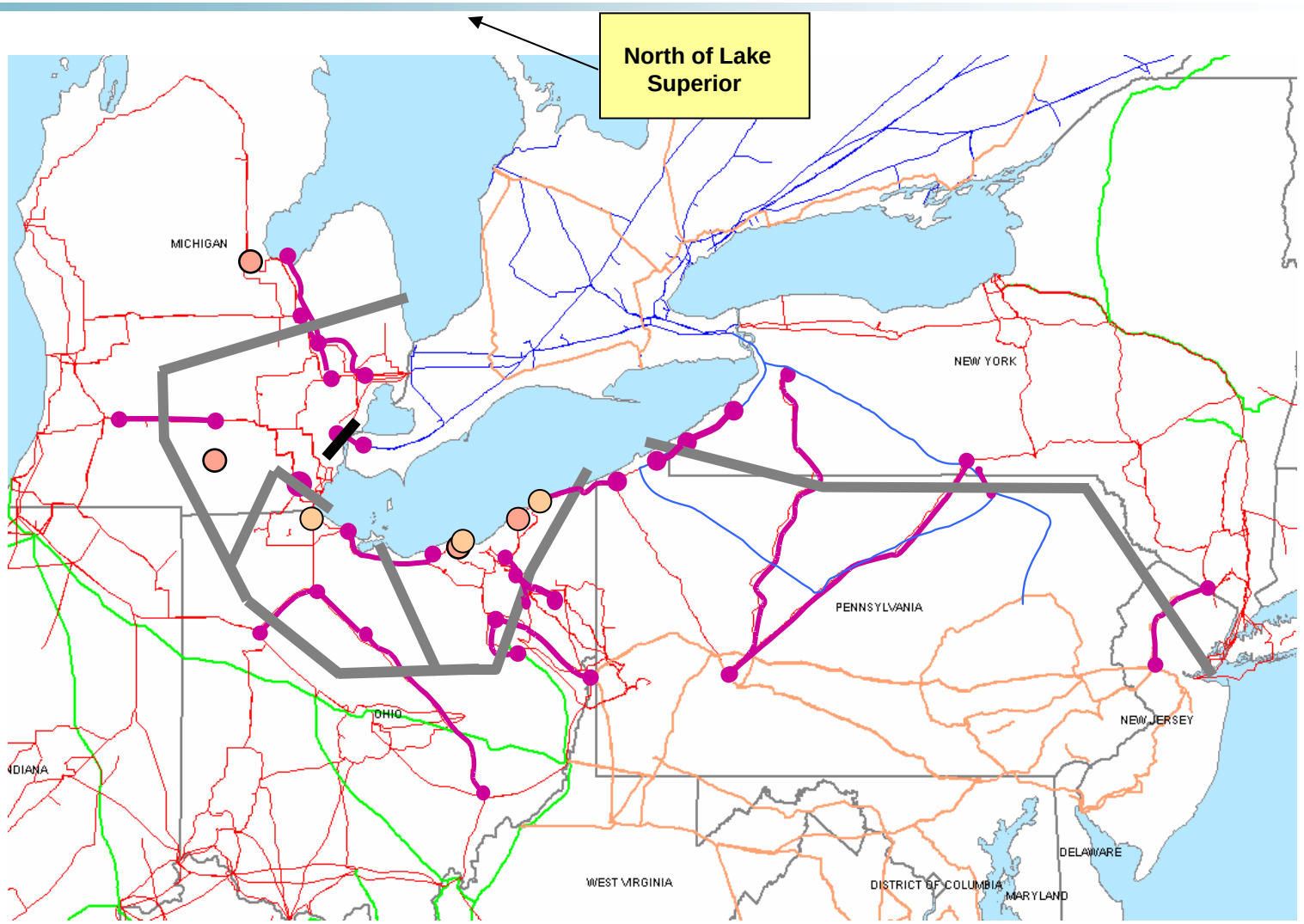
Blackout Cause Group 3
Reliability Coordinator Ineffective Diagnostics

- Reliability Coordinator (MISO for FE)
  - Reliability tools not ready
  - Reliance on local systems for reliability monitoring
  - Did not declare emergency or take any action
- PJM & MISO ineffective communications procedures and wide grid visibility to coordinate problems affecting their common boundaries

Power Transfers Shift at 4:10:38.6 PM

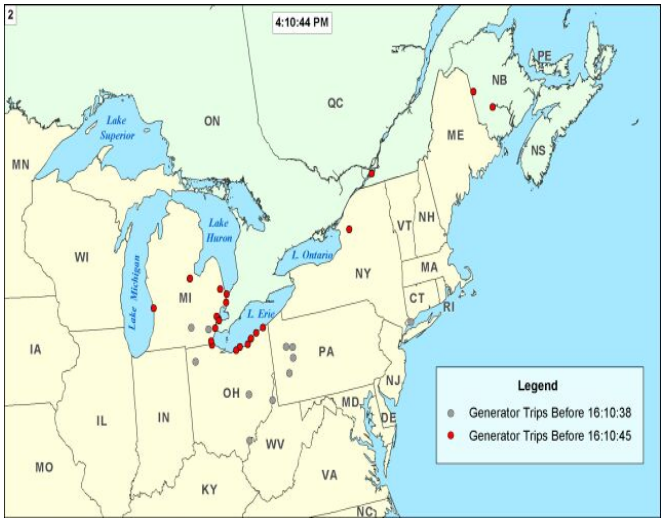


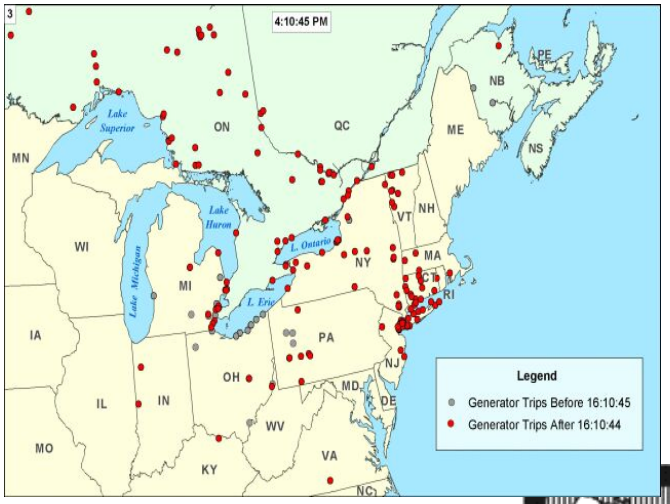
Northeast Completes Separation from Eastern Interconnection 4:10:43 – 4:10:45 PM



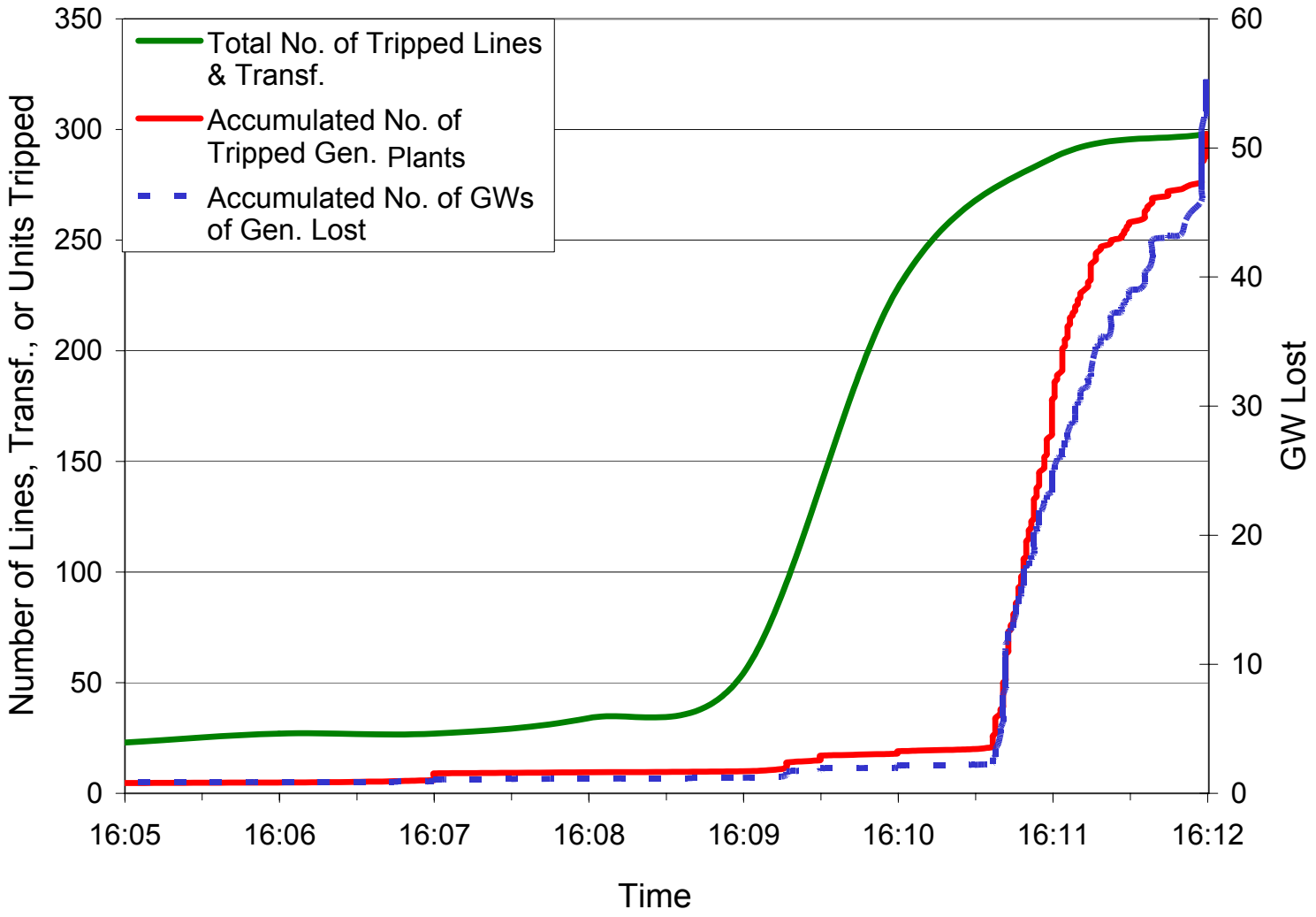
Power plants affected

- 531 units shut down at 263 plants
- During the conclusion of the cascading failure, generation tripped off in three general categories:
  - Extreme low voltage
  - High voltage failures
  - High/low frequency
- To date, little damage has been discovered as a result of the cascade

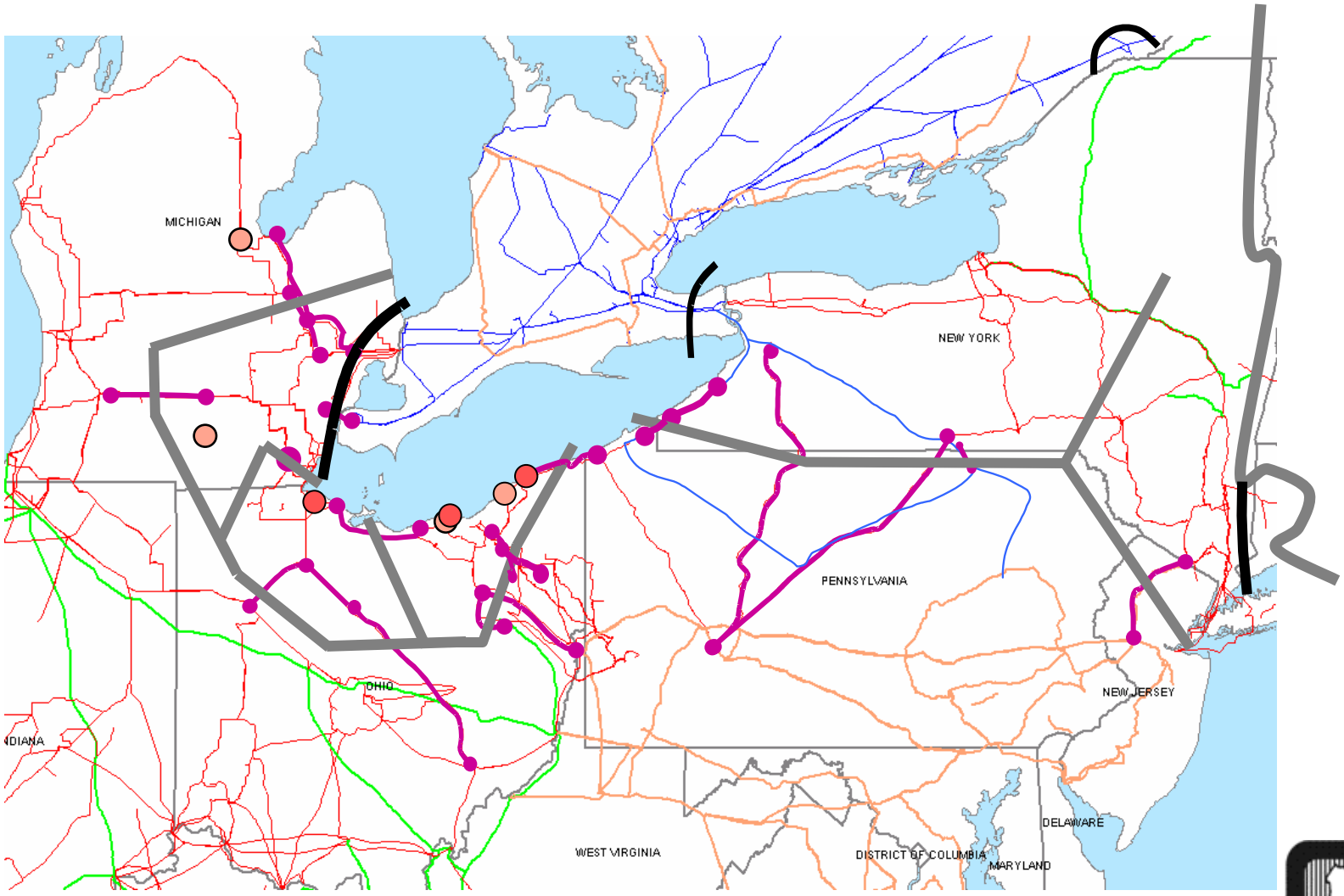




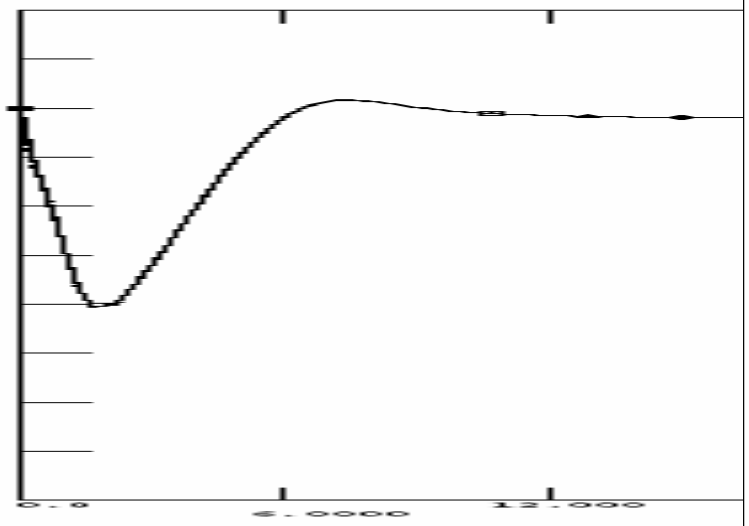
Transmission and Generation Trips

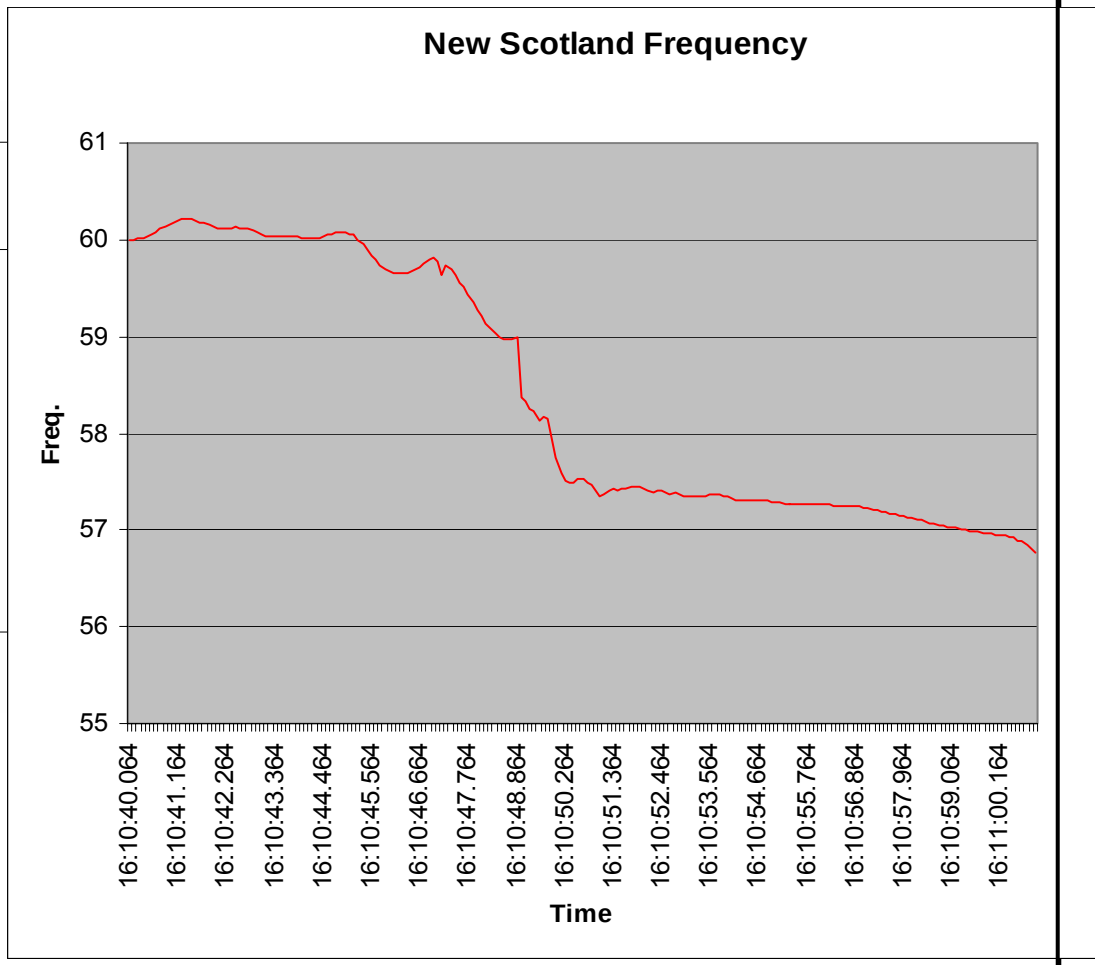


Island Breaks Up: 4:10:46 – 4:13 PM

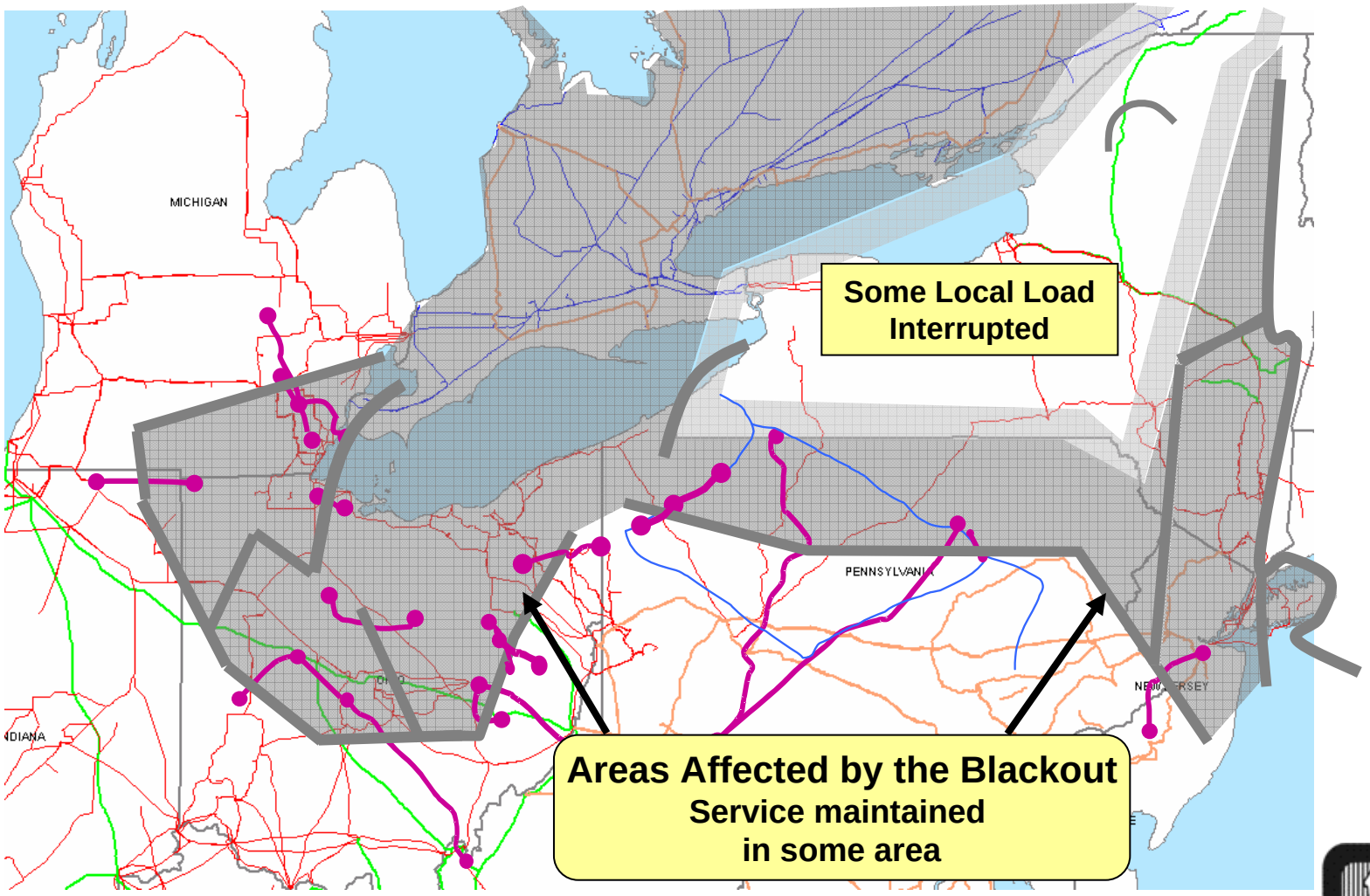


New York East UF Load Shedding





End of the Cascade

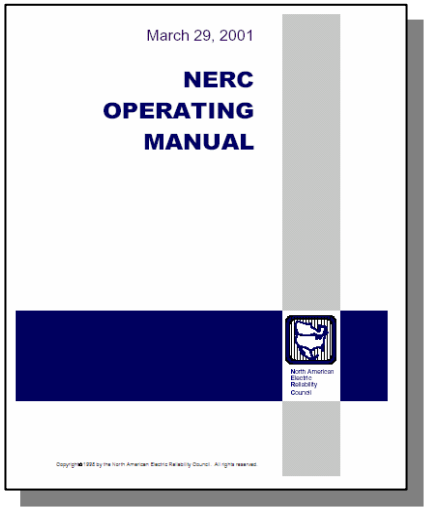


When the Cascade Was Over

- 50 million people
  8 states and 2 provinces
- 60-65,000 MW of load
  initially interrupted
  - Approximately 11% of Eastern Interconnection
- Sammis – Star trip at 4:06 PM – Blackout essentially complete by 4:13 PM
- High speed cascading lasted approximately 12 seconds
- Thousands of discrete events to evaluate
  - Time stamping - critical

Violations of NERC Reliability Standards

- FE did not return the system to safe operating state within 30 minutes (OP-2)
- FE did not notify others of impending emergency (OP-5)
- FE did not have effective monitoring capability (OP-5)



Operating Policies

- FE did not adequately train operating personnel for emergency response (OP-8)
- MISO did not notify others of impending emergency (OP-9)

Other Key Findings of Investigation

- Ineffective compliance monitoring
- Need for more detail in NERC standards
- Prior failures repeating
- System planning not effective
- Insufficient reactive and voltage control in FE area
- Protection and controls propagated the outage

NERC Strategic Initiatives

- Performance reviews
- Readiness audits
- Vegetation-related outage reporting
- Recommendations implementation tracking
- Accelerated standards transition
- Additional technical recommendations

Edison Mission Energy

An *EDISON INTERNATIONAL*SM Company

Reem Fahey

National Conference of Regulatory Attorneys
An IPP's Perspective on Mandatory Reliability Rules

May 18, 2004

Edison Mission Energy

Edison Mission Energy is an international power producer with approximately 19,000 MWs of generating assets worldwide. Midwest Generation, a subsidiary of Edison Mission Energy, operates seven power plants and five peaker sites in Illinois, and supervises the operations of one coal-fired plant in Pennsylvania totaling approximately 11,200 MWs.

Mandatory Reliability Rules

- There is general industry consensus that compliance with reliability rules should be mandatory and no longer voluntary

- However, there is no industry consensus in regards to:
  - How to properly unbundle reliability components and adequately price them
  - Process for financial compensation
  - Process for competitive bidding to procure reliability services

Mandatory Reliability Rules

- In light of the industry restructuring and the move towards competition, NERC rules and standards must be re-written to:
  - Clearly specify the "entity" that's responsible for compliance with the rules
  - Clearly define remedy for non-compliance
  - Work with RTOs, NAESB, FERC and State Commissions on financial compensation for the provision of reliability services

Examples of the Commercial Nature of Reliability

- Voltage Support and Reactive Supply
- Transmission Congestion
- Capacity Adequacy

Voltage Support and Reactive Supply

- The Blackout report recommends:

"FERC and appropriate authorities in Canda require all tariffs or contracts for the sale of generation to include provisions specifying that the generators can be called upon to provide or increase reactive power output if needed for reliability purposes, and that the generator will be **paid** for any lost revenues associated with a reduction of real power sales attributable to a required increase in the production of reactive power"

Voltage Support and Reactive Supply Compensation

- Non-RTO Model
  - No clear compensation rules
  - Generator obligation is defined under Interconnection Agreement
  - Obligation vague at best
  - Deals mostly with emergency situation
- RTO Model
  - Generator gets compensated for unit capability to provide reactive power
  - Generator has obligation to provide voltage support in real-time (both under normal & emergency operations)

Transmission Congestion

- The Blackout report recommends that the Transmission Line-Loading Relief (TLR) process should be clarified and streamlined

- The current process is "not fast and predictable enough for use in situations in which an Operating Security Limit is close to or actually being violated". NERC should develop an "alternative to TLRs"

Transmission Relief Compensation

- Non-RTO Model
  - Slow non-predictable process
  - Blunt tool that curtails transactions without regard to who values the use of the transmission system the most
  - No process for "buy-through" congestion
- RTO Model
  - Five minute redispatch process
  - Maintains system reliability at least cost
  - Allocates transmission usage to the entities that value it most

Resource Adequacy

- NERC must enforce mandatory compliance
- Non-RTO Model
  - Peer pressure and/or state requirement to carry adequate reserve margin
  - Raises equity issues in retail states
- RTO Model
  - Allocates capacity requirement to all load-serving entities
  - Financial penalties imposed for non-compliance

Final Remarks

- Congress and/or FERC should not transform compliance with reliability rules and standards from voluntary to mandatory without addressing compensation

- Reliability Golden Rule : There should be no financial incentive for any entity not to comply with reliability rules and standards

FERC's New Reliability Initiatives

Kevin Kelly
Director, Policy Analysis & Rulemaking, OMTR
Federal Energy Regulatory Commission

National Conference of Regulatory Attorneys
Chicago, IL
May 18, 2004

INTRODUCTION

- The regulator of interstate transmission is taking a new and active interest in grid reliability.
- FERC is involved in several reliability initiatives:
  - to get ready for this summer
  - to recognize the long-term growing dependence of Americans on electricity as a necessity of modern life
- A brief overview of a DOZEN actions FERC took following the August 14, 2003 blackout

1. Blackout Investigation

- The task force including Chairman Wood and Commission staff completed the final report on the blackout investigation on April 5, 2004.
- Commission staff helped to lead and conduct the U.S.-Canadian investigation of the August 14 blackout, along with NERC.
- Many of the contributing factors were the same as those identified in the blackouts of 1965, 1977 and 1996.

2. December 2003 Reliability Conference

On 12/1/03, FERC held a reliability conference:

- to get a staff report on the causes of the blackout

- to hear from NERC and WECC about their actions to improve reliability standards and to mandate compliance with these standards, and

- to hear public views of what actions the Commission itself should take to improve the current situation.

3. Study of First Energy Area

- On 12/24/03, FERC directed First Energy Corp. to study the vulnerabilities of northeast Ohio.
- Study under review now at FERC.
- If this study reveals significant problems, we will work with the Public Utilities Commission of Ohio, the Midwest ISO, and local utilities to determine how to make any needed improvements.

4. Revised Plans

- Early in 2004, FERC Chairman Pat Wood said transmission reliability is at the top of its agenda for 2004.
- FERC revised its Strategic Plan to incorporate the new reliability function.
- FERC rewrote its Business Plan to emphasize the importance of the new reliability initiatives.

5. Reliability Division and Staff

- New reliability division at FERC
- Outside industry experts & existing staff
- Recruiting Director and senior technical staff
- $5 million for reliability
- Same in President's budget for next year

6. Reliability Readiness Audits

- FERC's reliability staff volunteered to participate in NERC's Reliability Readiness Audits.
- February to June 2004, NERC volunteer teams auditing all major transmission operators and reliability coordinators in the U.S. and Canada.
- The audits look at “readiness”: whether the company has the equipment, training, and other resources needed to comply with NERC reliability standards.

7. Long-term Reliability Needs

- Long-term, strategic needs and issues
- Examples:
  - How are the best operators trained, both in the electric industry and other industries?
  - Can the grid around Lake Erie be designed to be less susceptible to cascading failure?
  - Does the nation have an adequate inventory of replacement transformers?

8. New Outreach Efforts

- Commissioners talked with many industry and government leaders
- Reliability legislation is the preferred means to assure a reliable system
- Discussed role of FERC, States, and Canadian agencies if legislation does not pass soon.
- Holding reliability discussions with NARUC, DOE, Natural Resources Canada, and the Canadian provincial regulators, the Nuclear Regulatory Commission, and others

9. NERC Participation and Improving NERC Standards

- Greater FERC participation in NERC activities
- Require compliance with NERC's reliability rules?
- Problem: lack of clarity of the reliability rules
- FERC has urged—and NERC has responded—to improve the enforceability of its rules soon

10. Vegetation Management Study and Reporting Order

- Vegetation Management Study
  - released early March 2004 at NARUC meeting
  - an immediate cause of the blackout
  - recommendations for better practices

- Vegetation Management Reporting Order
  - April 19 order: report tree-trimming practices
  - report to FERC, PUCs, NERC, RRCs
  - due June 17

11. Reliability Policy Statement

- April 19 Order
- Need for legislation
- Need for clear standards soon
- Good Utility Practice covers standards
- Need for intergovernmental cooperation
- Prudent reliability cost in FERC-set rates
- Staff Task Force to look at NERC funding

12. Reliability Workshop May 14, 2004

- On 5/4/04, notice for a workshop to be held jointly by the U.S.-Canada Power System Outage Task Force and the Federal Energy Regulatory Commission at the Commission on May 14, 2004.
- The workshop is to address both immediate and long-term measures needed to ensure a reliable electric system.

A Cooperative Effort

- The common goal of enhancing grid reliability
- We are working cooperatively with
  - State agencies
  - DOE, Canadian governments
  - NERC, regional reliability councils and industry stakeholder groups
- Goal: to help assure that grid failures like the blackout of August 14 become, if not a thing of the past, as rare as humanly possible

NATIONAL CONFERENCE OF REGULATORY ATTORNEYS
Section V: Guarding Against the Perfect Electric Storm
Remarks by Commissioner Kevin K. Wright (IL)
May 18, 2004

OUTLINE

I. State Response to August 14, 2003 Blackout
   A. The Blackout's Silver Lining
      1. States look inward/examine infrastructure and reliability
      2. The reliability dialogue becomes a policy/political issue.

   B. Illinois Governor creates Task Force on Energy Infrastructure
      1. Can a Blackout occur in Illinois? If not, why not?
      2. Hearings held, utility CEO's testify, report due June 2004

   C. Illinois Commission conducts Focused Review of ComEd's Transmission System Protection
      1. Review verifies ComEd's performance in five categories
         a. transmission system studies
         b. transmission protection system design
         c. transmission protection device ratings
         d. transmission protection equipment maintenance
         e. verification of selected transmission relay settings
      2. Focused Review says ComEd's transmission system studies, design, ratings, and maintenance practices are "adequate to prevent cascading blackout events"

II. State PUCs/PSCs Role: Guarding Against the Perfect Storm
   A. Congress, Federal Agencies, Regional Coordinating Organizations play critical role; State Commissions have shared responsibility to ensure reliability
      1. Evaluate public utility laws
      2. Evaluate reliability rules and procedures

   B. Illinois 1997 Restructuring Law Reliability Requirements
      1. Annual reporting requirements for state regulated utilities
         a. information on outages, facility condition, maintenance expenditures, future investment plans, customer satisfaction

b. utilities' annual reliability reports examined by commission
c. service restoration in non-discriminatory manner, customer reimbursement for damages over 30K customers, 4hrs.

2. Reliability performance rules
   a. historical performance and established reliability targets
   b. trends in reliability performance by each utility
   c. id, assessment, recommendations for reliability problems
   d. utilities reliability plan review for previous period
3. Significant finding is tree trimming on distribution side
   a. tree trimming/veg management first places utilities cut
   b. state commissions must deliver message about tree trimming and vegetation management high priority
4. U of I/Argonne Transmission Study
   a. a comprehensive study of Illinois' transmission system
   b. id unexpected load pockets/areas for transmission upgrades
5. Lessons learned from ComEd meltdown, summer 1999
   a. significant investment/upgrades to transmission/distribution
   b. may be factor why blackout didn't hit Illinois and why it is better positioned against cascading blackouts/major outages
   c. state's 23 major interconnections and connections in 4 directions give it flexibility and import capability

III. RTOs: A State Insurance Plan Against Perfect Electric Storm

A. Reliability, Regional Coordination, and Market Rules are Strengths
   1. mandatory resource adequacy requirements and effect
   2. requirements helpful in absence of mandatory reliability rules

B. PJM-MISO Joint Operating Agreement (JOA)
   1. reliability and coordination protocols between 2 RTO's
   2. joint and common market, seamless ooperations
   3. historic/unprecedented agreement; blueprint for others

IV. States Shared Responsibility: Vigilance on a Going Forward Basis

A. Vigilance is Watchword for State Commissions
   1. transmission expansion and planning
   2. continued assessment of and utility investment in transmission/distribution infrastructure
   3. reliability rules and performance metrics
   4. utility transmission/distribution practices/decisions

Note Paper